

**W1-2-60-1-6**

## JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

**UNIVERSITY EXAMINATIONS 2020/2021**

**YEAR 1 SEMESTER 1 EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN MEDICAL LABORATORY SCIENCES**

**MLS 2108: PRINCIPLES OF ORGANIC CHEMISTRY**

**DATE: JANUARY 2021 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS**

QUESTION ONE (30 MARKS)

a) Give IUPAC names of the following compounds: (10 marks)

b) Define the following terms as used in organic chemistry. Give examples where possible.

1. Catenation
2. SP3 hybridization
3. Non-polar covalent
4. Electronegativity
5. Symmetrical alkene (5 marks)

c) Name any three natural sources of organic compounds (3 marks)

d) Show the hybridization state of each carbon atom in the following molecules. (3 marks)

e) Complete the following reaction equations by giving the major product(s) where more than one product is possible. (8 marks)

QUESTION TWO (20 MARKS)

a) Starting with Pent-1-ene show how you would prepare the following:

1. Pentan-2-ol
2. Bromopentane
3. 1,2 dibromopentane
4. Pentan-1, 2- diol
5. Methanal and butanal (10 marks)

b) Write all the possible structural isomers of the following compounds

1. C3H4
2. C4H8 (4 marks)

c) Give IUPAC names for the compounds in (2b) above (4 marks)

d) The general formular for alkanes is CnH2n+2. what is the general formula of cycloalkenes with one double bond (2 marks)

QUESTION THREE (20 MARKS)

a) Give simple visual chemical tests to distinguish between the following:

1. Hexane and Hexene
2. Propanone and Propanal
3. 3-hexanol and 1-hexanol (6 marks)

b) Using the idea of hybridization explain bonding in ethane (5 marks)

c) What are the main differences between organic and inorganic compounds? (6 marks)

d) Arrange the following compounds in order of increasing solubility in water and explain your answer. (3 marks)

CH3CH2CH2OH, CH3CH2CH2CH3 HOCH2CH2CH2OH

QUESTION FOUR (20 MARKS)

a) (i) Starting with benzene show how you would prepare (6 marks)

(ii) Distinguish giving examples between elactrophilic and nucleophilic substitution reactions. (4 marks)

b) What information is obtained from each of the following spectroscopic methods in analysis of organic compounds

1. IR
2. NMR
3. MS (3 marks)

c) i) Between IR and MS techniques which would be the best to distinguish between the following: (2 marks)

ii) Between NMR and IR which would be best to distinguish between the following:

CH3OCH2CH3 and CH3OCH3 (2 marks)

d) Identify and name the functional groups in caffeine in (3 marks)

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